



Huntington Power Plant

6 miles west of Huntington, Utah on Hwy. 31
P.O. Box 680
Huntington, Utah 84528

January 5, 2016

Mr. Bryce Bird, Director
Utah Department of Environmental Quality
Division of Air Quality
195 North 1950 West
P.O. Box 144820
Salt Lake City, UT 84114-4820

RE: **4th Quarter, 2015 Particulate Matter Compliance Test Report - 40 CFR 63 SubPart UUUUU,**
Huntington Power Plant (Title V Permit #1501001004)

Dear Mr. Bird,

In accordance with Title V Permit Conditions II.B.2.g.1(b) (Unit 1), II.B.3.f.1(b) (Unit 2), and 40 CFR §63.10021(d) the Huntington Power Plant submits this 4th Quarter 2015 Particulate Matter (PM) Compliance Test Report. 40 CFR §63.10031(f)(6) requires the submittal of compliance test results that were generated prior to April 16, 2017. This submittal is intended to satisfy the report submittal for Huntington Units 1 and 2, and includes the portable document format (PDF) report that is submitted electronically via the Emissions Collection and Monitoring Plan System (ECMPS).

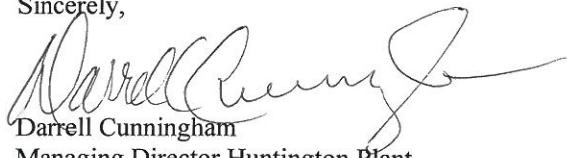
The results of the 4th Quarter 2015 PM test results are:

Unit	Emission rate (lb/mmBtu)
1	0.004
2	0.008

I am authorized to make this submission on behalf of the owners and operators of the affected source or affected units for which the submission is made. I certify under penalty of law that I have personally examined, and am familiar with, the statements and information submitted in this document and all its attachments. Based on my inquiry of those individuals with primary responsibility for obtaining the information, I certify that the statements and information are to the best of my knowledge and belief true, accurate, and complete. I am aware that there are significant penalties for submitting false statements and information, or omitting statements and information, including the possibility of fine or imprisonment.

Should you have any questions regarding this information, please contact Richard Neilson, Huntington Power Plant Environmental Engineer at (435) 687-4334 or me at (435) 687-4211.

Sincerely,



Darrell Cunningham
Managing Director Huntington Plant
Responsible Official

Enclosures: Emissions Testing Report for PacifiCorp Huntington Unit 1 – Particulate Matter Compliance Testing
Emissions Testing Report for PacifiCorp Huntington Unit 2 – Particulate Matter Compliance Testing

cc: David Barnhisel
Steve Jensen
Director, USEPA Region VIII, w/enclosures



Emissions Testing Report for PacifiCorp
Huntington Unit 1
Huntington, Utah

Particulate Matter Compliance Testing

40 CFR Part 63, Subpart UUUUU

Test Date: December 15, 2015

Project Code PC15-0001.18

Executive Summary

EMCo was contracted by PacifiCorp to conduct compliance testing at the Huntington Power Plant near Huntington, Utah. Testing was performed to determine emission rates of particulate matter (PM) from the exhaust stack of Huntington Unit 1. Compliance test results are summarized in the table below; detailed test results are given in the following report.

PaciCorp Huntington Power Plant PM Compliance Test Results Summary						
Source	Parameter	Date	Average Value	Emission Limit		
Huntington Unit 1	Filterable Particulate Matter	12/15/2015	0.004	0.030 lb/mmBtu		
			0.07	0.30 lb/MW-hr		
Each result is the average of three two-hour test runs.						
<u>Abbreviations:</u> lb/mmBtu: pounds per million British thermal units lb/MW-hr: pounds per megawatt hour						

Introduction

EMCo was contracted by PacifiCorp to conduct source testing services at the Huntington Power Plant near Huntington, Utah. The Huntington Plant comprises two pulverized coal-fired boilers. Huntington Unit #1 is equipped with low-NO_x burners and overfire air for nitrogen oxides (NO_x) control, a flue gas desulfurization (FGD) scrubber for sulfur dioxide (SO₂) control and pulse-jet fabric filters for particulate matter (PM) control. Testing was conducted in accordance with the requirements of 40 CFR Part 63 Subpart UUUUU, National Emission Standards for Hazardous Air Pollutants (NESHAP): Coal- and Oil-Fired Electric Utility Steam Generating Units.

Contact information for the project is listed in the table below.

Contact	Affiliation	Telephone	E-mail
Frank Zampedri Environmental Analyst	PacifiCorp	(801) 220-2169	frank.zampedri@pacificorp.com
Richard Neilson Environmental Engineer		(435) 687-4334	richard.neilson@pacificorp.com
Rob Leishman Environmental Scientist	UDEQ	(801) 536-4438	rleishman@utah.gov
Mike Corrigan Project Manager	EMCo	(801) 599-5370	mcorrigan@stacktest.us

Scope of Work

Testing was performed to determine concentrations and mass emission rates of particulate matter (PM) for comparison to the applicable emission limits listed in the table below.

Source	Regulation	Parameter	Emission Limit
Huntington Unit 1	NESHAP UUUUU	PM (lb/mmBtu)	0.030 lb/mmBtu
		PM (lb/MW-hr)	0.30 lb/MW-hr
Abbreviations: lb/mmBtu: pounds per million British thermal units lb/MW-hr: pounds per megawatt-hour			

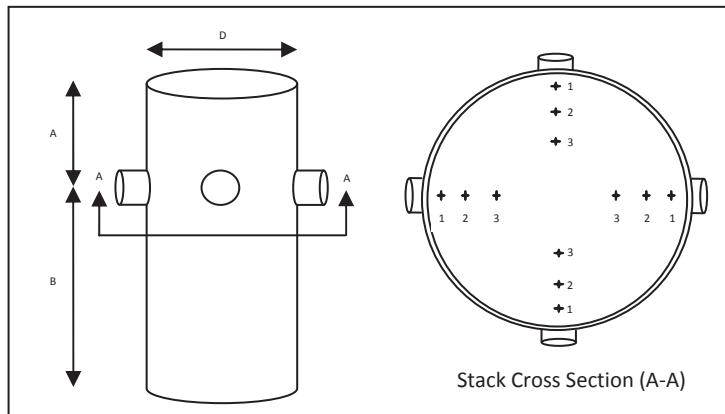
Testing Methods

EMCo used the following EPA Reference Methods for the testing program. No deviations from the Reference Methods were noted.

Parameter	EPA Reference Methods	Test Runs/Duration	Target Sample Volume
PM (lb/mmBtu)	1, 2, 3B, 4, 5*, 19	3 @ 2 hr	2 dscm (70.63 dscf)**
*In accordance with Table 5 of NESHAP Subpart UUUUU, the front-half temperature was set at 320° ± 25°F.			
**Sample volume from Table 2 of NESHAP Subpart UUUUU, doubled in accordance with §63.10005.			

Testing Location

The Huntington Unit #1 exhaust sampling location consists of a vertical, circular stack with four orthogonal sampling ports located at least six diameters downstream and two diameters upstream of the nearest flow disturbances. PM testing was performed across a grid of 12 points determined using EPA Method 1. See the schematic below.



Huntington Test Diagram	
Unit #	1
Diameter (D)	323.3"
Upstream Distance (A)	>220'
Downstream Distance (B)	>266'
Sample Point Distances from Stack Wall	
Traverse Point 1	14.1"
Traverse Point 2	47.3"
Traverse Point 3	95.7"

Test Results

The results of the testing program are given in the tables below. Detailed test results are located in Appendix A, along with sample calculations for all computed values.

PacificCorp Huntington Unit 1 PM Compliance Test Results Summary (12/15/2015)						
Parameter	Run #1	Run #2	Run #3	Average	QA Specification	Emission Limit***
Start Time	7:26	10:15	13:17	—	—	—
Stop Time	9:36	12:25	15:21	—	—	—
Sample Gas Volume (dscf)	135.63	82.84	82.37	100.28	>70.63*	—
Isokinetic Variation (%)	92.5	94.9	93.5	93.7	100 ± 10%	—
Filterable PM (lb/mmBtu)	0.003	0.005	0.003	0.004	—	0.030
Boiler Load (MW)	475	475	475	475	>468**	—
Filterable PM (lb/MW-hr)	0.05	0.09	0.07	0.07	—	0.30

* Sample volume from Table 2 of NESHAP Subpart UUUUUU, doubled in accordance with §63.10005.
**90% of design capacity, in accordance with §63.10007(a)(2).
***As shown, average PM emissions were less than 50% of the applicable emission limit, qualifying the unit for Low Emitting EGU (LEE) status.

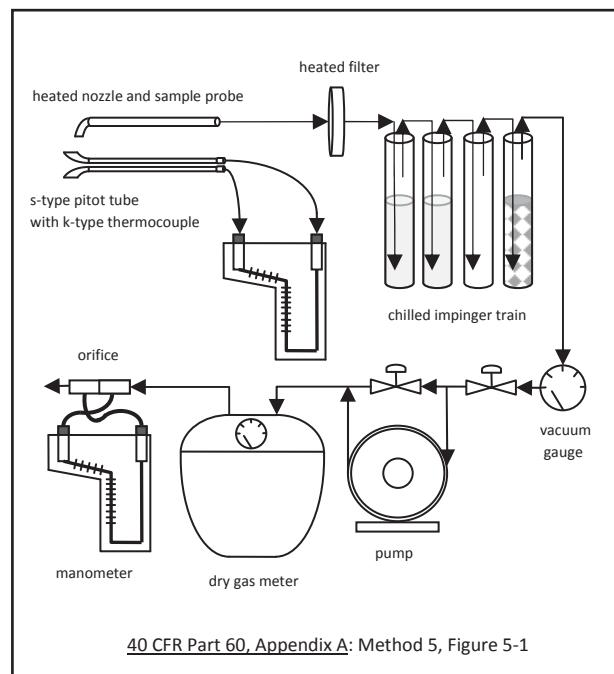
Testing Equipment

All testing equipment was housed in a climate-controlled mobile analytical laboratory designed and built by EMCo. All required quality assurance tests were performed as required by the applicable Reference Methods. Detailed equipment descriptions are given in the table below.

Parameter	Equipment	EPA Reference Method(s)
Particulate Matter (PM)	Heated probe with glass nozzle and stainless steel probe liner Quartz fiber filter S-type pitot tube K-type thermocouple Inclined-vertical manometer Dry gas meter Digital scale Analytical balance	1, 2, 3B, 4, 5B, 19

Test Details

Particulate matter testing was performed using EPA Methods 1, 2, 3B, 4 and 5. Each test run was 120 minutes in duration. Sampling was performed along a grid of points determined using EPA Method 1. Exhaust gas flow measurements were taken using an S-type pitot tube, K-type thermocouple and inclined-vertical manometer in accordance with EPA Method 2. A sample of exhaust gas was withdrawn from the stack at an isokinetic flow rate through a heated stainless steel nozzle and probe, through a heated quartz-fiber filter, through four chilled glass impingers containing known masses of water or silica gel, and through a dry gas meter. (See Figure 5-1 at right.) The default dry molecular weight for combustion sources (30 lbs/lb-mole) listed in EPA Method 3 was combined with pressure and temperature measurements to calculate stack gas velocity in accordance with EPA Method 2. Stack gas moisture concentrations were determined gravimetrically in accordance with EPA Method 4. Following each sampling period, the filter and rinses of the nozzle and probe were recovered and returned to EMCo's laboratory for gravimetric analysis. Following analysis, the particulate mass captured during each test run was combined with concurrent flow and moisture data to calculate particulate matter emissions in units of pounds per hour (lb/hr). The particulate mass captured during each test run was combined with concurrent CO₂ concentration data from the plant CEMS¹ and the appropriate fuel F-factor from EPA Method 19 (1,800 scf/mmBtu) to calculate PM emissions in units of pounds per million British thermal units (lb/mmBtu) for comparison to the applicable emission limit.



¹ EPA Method 3B §6.0 states "As an alternative to the sampling apparatus and systems described herein, other sampling systems may be used, provided such systems are ... capable of yielding acceptable results." As NESHAP UUUUUU requires certified Part 75 CEMS CO₂ data to calculate SO₂ and mercury emissions in units of lb/mmBtu, CEMS CO₂ data are considered acceptable for PM emission calculations as well.

Appended Information

Supporting data for this testing program are included as follows.

Appendix A: Test Summary

- Data Reduction Spreadsheet
- Sample Calculations

Appendix B: Field Data

- Field Datasheets

Appendix C: CEMS Data

- Test Run CEMS Printouts

Appendix D: Laboratory Data

- Gravimetric Analysis

Appendix E: Calibration Information

- Dry Gas Meter Pre-Test and Post-Test Calibrations
- Critical Orifice Calibration Certificate
- AETB Certification



Project PC15-0001.18
Appendix A: Test Summary
Data Reduction Spreadsheets
Sample Calculations

	Run #	1	2	3
	Start Time	7:26	10:15	13:17
	Stop Time	9:36	12:25	15:21
Θ	Sample Time (min.)	120	120	120
EPA Method 2 Data		1	2	Average
Inputs				
D _s	Stack Diameter (inches)	323.3	323.3	323.3 323.3
P _{bar}	Barometric Pressure ("Hg)	23.3	23.3	23.3 23.30
P _g	Stack Static Pressure ("H ₂ O)	-2.7	-2.7	-2.7 -2.7
C _p	Pitot Tube Coefficient (unitless)	0.84	0.84	0.84 0.84
VΔP _{avg}	Avg. Velocity Head of Stack Gas V("H ₂ O)	1.5163	1.5463	1.5615 1.5414
T _s	Stack Gas Temperature (°F)	106	106	106 106
Calculations				
A	Stack Area (ft ²)	570.084	570.084	570.084 570.084
P _g	Stack Static Pressure ("Hg)	-0.20	-0.20	-0.20 -0.20
M _d	Stack Gas Molecular Weight, dry basis (lb/lb-mole)	30.00	30.00	30.00 30.00
M _s	Stack Gas Molecular Weight, wet basis (lb/lb-mole)	29.08	28.80	28.80 28.89
P _s	Absolute Stack Pressure ("Hg)	23.10	23.10	23.10 23.10
T _{s(abs)}	Absolute Stack Gas Temperature (°R)	566	566	566 566
V _s	Stack Gas Velocity (ft/sec)	99.9	102.4	103.4 101.9
Q	Stack Gas Dry Volumetric Flow Rate (dscf/hr)	136,448,387	136,252,727	137,592,080 136,764,398
Q	Stack Gas Dry Volumetric Flow Rate (dscf/min)	2,274,140	2,270,879	2,293,201 2,279,407
CEMS Diluent Data		1	2	Average
CO ₂ (%vw)				
		10.8	10.8	10.8 10.8
CO ₂ (%vd)				
		11.7	12.0	12.0 11.9
EPA Method 4 Data		1	2	Average
Inputs				
V _{lc}	Volume of Water Condensed (mL)	238.4	205	194.8 212.7
V _m	Volume of Stack Gas Collected (dcf)	167.955	104.724	103.696 125.458
Y	Meter Calibration Factor (unitless)	0.9827	0.9827	0.9827 0.9827
ΔH	Pressure Differential Across Orifice ("H ₂ O)	5.6	2.1	2.2 3.3
T _m	Temperature at Gas Meter (°F)	49	54	52 52
Calculations				
P _m	Absolute Pressure at Gas Meter ("Hg)	23.71	23.45	23.46 23.54
T _m	Absolute Temperature at Gas Meter (°R)	509	514	512 511.7
V _{wc(std)}	Volume of Water Condensed (scf)	11.22	9.65	9.17 10.01
V _{m(std)}	Sample Gas Volume (dscf)	135.63	82.84	82.37 100.28
B _{ws act}	Observed Stack Gas Moisture Content (%/100)	0.076	0.104	0.100 0.094
B _{ws sat}	Saturated Moisture Content (%/100)	0.100	0.100	0.100 0.100
B _{ws}	Moisture Content Used (%/100)	0.076	0.100	0.100 0.092
EPA Method 5 Data		1	2	Average
Inputs				
D _n	Nozzle diameter (")	0.237	0.183	0.183 0.201
C1	Mass of PM collected on filter (mg)	3.5	4.9	2.9 3.8
C2	Mass of PM collected in rinses (mg)	7.7	7.2	5.7 6.9
Emission Calculations				
F _c	Fuel F-Factor (scf/mmBtu)	1800	1800	1800 1800
A _n	Cross-sectional area of nozzle (ft ²)	3.06E-04	1.83E-04	1.83E-04 2.24E-04
I	Isokinetic variation (%)	92.5	94.9	93.5 93.7
m _n	Total Filterable PM mass less blank (mg)	11.2	12.1	8.6 10.6
C _s	Filterable Particulate concentration (gr/dscf)	0.001	0.002	0.002 0.002
C _s	Filterable Particulate concentration (lb/dscf)	1.82E-07	3.22E-07	2.30E-07 2.45E-07
E _{lb/hr}	Filterable Particulate mass emission rate (lb/hr)	25	44	32 33
	Boiler Load (MW)	475	475	475 475
	Filterable Particulate mass emission rate (lb/MW-hr)	0.05	0.09	0.07 0.07
F _c	Filterable Particulate mass emission rate (lb/mmBtu)	0.003	0.005	0.003 0.004
8760 hrs/yr	Filterable Particulate mass emission rate (tons/year)	109	192	139 147

EPA Method 5: Determination of Particulate Matter Emissions (40 CFR Part 60, Appendix A-1)

Variables

Variable	Value	Definition	Unit of Measurement
D _s	323.3	Stack Diameter	inches
A	570.08	Cross-Sectional Area of the Stack	ft ²
P _g	-2.70	Stack Static Pressure	in. H ₂ O
P _g	-0.20	Stack Static Pressure	in. Hg
%CO ₂	11.7	Concentration of Carbon Dioxide	Dry Volume Percent (%vd)
M _d	30.00	Dry Molecular Weight of the Stack Gas (default)	lb/lb-mole
P _{bar}	23.30	Barometric Pressure	in. Hg
ΔH	5.60	Pressure Differential across Orifice	in. H ₂ O
P _m	23.71	Absolute Pressure at Gas Meter	in.Hg
t _m	49	Temperature at Gas Meter	°F
T _m	509	Absolute Temperature at Gas Meter	°R
K1	0.04706	Conversion Factor	ft ³ /mL
V _{lc}	238.4	Volume of Water Condensed	g
V _{wc(std)}	11.22	Volume of Water Condensed	scf
K ₄	17.64	Constant	°R/in.Hg
Y	0.9827	Meter Calibration Factor	Unitless
V _m	167.955	Volume of Stack Gas Collected	dcf
V _{m(std)}	135.631	Sample Gas Volume	dscf
B _{ws}	0.076	Stack Gas Moisture Content	%/100
M _s	29.08	Actual Molecular Weight of the Stack Gas	lb/lb-mole
P _s	23.10	Absolute Stack Pressure	in. Hg
T _s	106	Average Stack Temperature	°F
T _{s(abs)}	566	Average Absolute Stack Temperature	°R
K _p	85.49	Conversion Factor	(ft/sec) x V(((lb/lb-mole)(in.Hg))/((°R)(in.H ₂ O)))
C _p	0.84	Pitot Coefficient	Dimensionless
AvgVΔp	1.5163	Average Square Root of Velocity Head Readings	in. H ₂ O
V _s	99.94	Average Stack Gas Velocity	ft/sec
T _{std}	528	Standard Absolute Temperature	°R
P _{std}	29.92	Standard Absolute Pressure	in. Hg
Q	136,448,387	Dry Volumetric Flow Rate Corrected to Standard Conditions	dscf/hr
D _n	0.237	Nozzle Diameter	inches
A _n	3.06E-04	Cross-Sectional Area of the Nozzle	ft ²
m _n	11.20	Total PM Mass	mg
C _s	1.82E-07	Particulate Concentration	lb/dscf
E _{lb/hr}	24.8	PM Mass Emission Rate	pounds per hour
F _c	1800	F-Factor from EPA Method 19	scf/mmBtu
E _{lb/mmBtu}	0.003	PM Mass Emission Rate	pounds per million Btu
E _{tons/yr}	108.8	PM Mass Emission Rate	tons per year
K ₅	0.0945	Constant	(in.Hg · min) / (°R · sec)
Θ	120	Sample Time	minutes
I	92.5 %	Isokinetic variation	percent

PC15-1.18
PaciFiCorp
Huntington Unit 1
Run #1 Sample Calculations

EPA Method 5: Determination of Particulate Matter Emissions (40 CFR Part 60, Appendix A-1)

$$A = \pi(D_s/24)^2$$

$$\pi(323.3/24)^2$$

$$= 570.08 \text{ ft}^2$$

$$P_g = P_{bar}/13.6$$

$$= -2.7/13.6$$

$$= -0.20 \text{ in. Hg}$$

$$M_d = 30.00 \text{ lb/lb-mole}$$

$$P_m = P_{bar} + (\Delta H/13.6)$$

$$= 23.3 + (5.6/13.6)$$

$$= 23.71 \text{ in. Hg}$$

$$T_m = 460 + t_m$$

$$= 460 + 49$$

$$= 509 \text{ R}$$

$$V_{wc(std)} = K_1 \times V_{lc}$$

$$= 0.04706 \times 238.4$$

$$= 11.22 \text{ scf} \quad (Eq. 4-1)$$

$$V_{m(std)} = \frac{K_4 \times Y \times V_m \times P_m}{T_m}$$

$$= \frac{17.64 \times 0.9827 \times 167.955 \times 23.71}{509}$$

$$= 135.63 \text{ dscf} \quad (Eq. 4-3)$$

$$B_{ws} = \frac{V_{wc(std)}}{V_{wc(std)} + V_{m(std)}}$$

$$= \frac{11.22}{11.22 + 135.63}$$

$$= 0.076 (\%/100) \quad (Eq. 4-4)$$

$$M_s = M_d \times (1 - B_{ws}) + (18.0 \times B_{ws})$$

$$= 30.00 \times (1 - 0.076) + (18.0 \times 0.076)$$

$$= 29.08 \text{ lb/lb-mole} \quad (Eq. 2-6)$$

$$P_s = P_{bar} + P_g$$

$$= 23.3 + (-0.20)$$

$$= 23.10 \text{ in. Hg}$$

$$T_{s(abs)} = 460 + T_s$$

$$= 460 + 106$$

$$= 566 \text{ R}$$

EPA Method 5: Determination of Particulate Matter Emissions (40 CFR Part 60, Appendix A-1)

$$V_s = K_p \times C_p \times Avgv/\Delta p \times \sqrt{\frac{T_{s(abs)}}{(P_s \times M_s)}}$$

$$= 85.49 \times 0.84 \times 1.5163 \times \sqrt{\frac{566}{(23.10 \times 29.08)}}$$

$$= 99.9 \text{ ft/sec}$$

(Eq. 2-7)

$$Q = 3600 \times (1 - B_{ws}) \times (V_s) \times (A) \times \frac{(T_{std} \times P_s)}{(T_{s(abs)} \times P_{std})}$$

$$= 3600 \times (1 - 0.076) \times (99.94) \times (570.08) \times \frac{(528 \times 23.10)}{(566 \times 29.92)}$$

$$= 136,448,387 \text{ dscf/hr}$$

(Eq. 2-8)

$$A_n = \pi(D_n/24)^2$$

$$\pi(0.237/24)^2$$

$$= 3.06E-04 \text{ ft}^2$$

$$C_s = \frac{m_n}{(mg/g)(g/lb)(V_{m(std)})}$$

$$= \frac{11.2}{(1000)(453.592)(135.631)}$$

$$= 1.82E-07 \text{ lb/dscf}$$

$$E_{lb/hr} = C_s \times Q$$

$$= 1.82E-07 \times 136448387$$

$$= 24.8 \text{ lb/hr}$$

$$E_{lb/mmBtu} = \frac{C_s \times F_c \times 100}{(CO_2\%vd)}$$

$$= \frac{1.82E-07 \times 1800 \times 100}{(11.7)}$$

$$= 0.003 \text{ lb/mmBtu}$$

$$E_{tons/yr} = \frac{E_{lb/hr} \times (\text{Hrs/yr})}{(\text{lbs/ton})}$$

$$= \frac{24.84 \times 8,760}{2000}$$

$$= 108.8 \text{ tons/year}$$

$$I = \frac{K5 \times T_{s(abs)} \times V_{m(std)} \times 100}{P_{s(abs)} \times V_s \times A_n \times \Theta \times (1 - B_{ws})}$$

$$= \frac{0.0945 \times 566 \times 135.631 \times 100}{23.10 \times 99.94 \times 3.1E-04 \times 120 \times (1 - 0.076)}$$

$$= 92.5 \%$$

(Eq. 5-7)



Project PC15-0001.18
Appendix B: Field Data
Field Datasheets

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Emissions Measurement Company: Method 5 Data Sheet

EMCo Job #:	FC 15-01	Operator(s):	WS, MC
Client:	PACIFIC P	Barometric pressure ("Hg):	23.3
Source:	Huntington 11	Static pressure ("H ₂ O):	-2.7
Date:	12/15/15	Leak Check ("H ₂ O @ Vac):	0.00@15"
Run #		Leak Check ("H ₂ O @ Vac):	0.20@18"
Meterbox ID:	M5-2	Pitot ID / Coeff:	0.89
Meterbox Y =	.9827	ΔH@ =	1.19
O ₂ %:	7.1	Pitot Leak Check:	✓
CO ₂ %:	12.2	Nozzle Diameter:	0.237
Start Time	07:26	K Factor:	2.43
		Stop Time	9:36

Impinger Weights (x.x g)	Initial	Final
Impinger 1		
Impinger 2		
Impinger 3		
Impinger 4 (SG)		
Total	79.5	1030.9
	Total	1238.4
Filter ID:	736	
Tin ID:	1337	

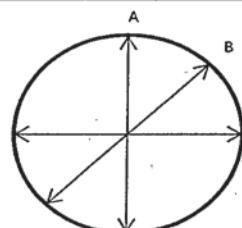
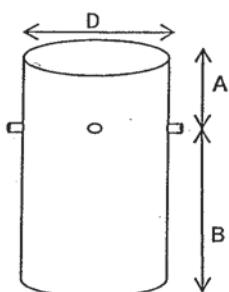
Traverse Point	Sample Time	Stack Temp (°F)	Probe Temp (°F)	Filter Temp (°F)	Velocity ΔP ("H ₂ O)	Orifice Pressure ΔH ("H ₂ O)	Vacuum ("Hg)	Sample Volume (ft ³)	DGM Temp (°F) Inlet	DGM Temp (°F) Outlet	Imp. Outlet Temp (°F)
								7.620			
1-1	10	106	300	322	2.2	5.3	8	21.8	41	37	53
1-2	20	107	303	318	2.2	5.3	8	33.5	45	38	56
1-3	30	106	301	320	2.3	5.6	9	48.1	50	40	50
2-1	40	105	306	320	2.2	5.3	8	61.4	51	41	65
2-2	50	106	300	320	2.4	5.8	9	75.9	54	43	64
2-3	60	106	301	323	2.4	5.8	9	90.8	55	45	62
3-1	70	106	303	323	2.2	5.3	7	101.7	55	46	55
3-2	80	106	305	320	2.3	5.6	8	117.8	55	47	51
3-3	90	107	306	325	2.4	5.8	8	137.6	56	48	50
4-1	100	106	300	322	2.2	5.3	8	146.9	56	48	41
4-2	110	106	300	319	2.4	5.8	9	160.2	60	49	52
4-3	120	106	301	318	2.4	5.8	9	175.515	61	49	52
12	120	(106)	300	318	1.5163	5.558	9	167.955	49		65
Total	Total	Average	Minimum.	Minimum	Avg. ΔP	Average	Max.	Total	Average		Maximum

Stack Schematic

Stack Diameter (D)=

Distance A=

Distance B=



Nozzle Calibration

A= .237

B= .237

C= .237

Average = .237

Max Difference = 0

(Must be < 0.004 in.)

Emissions Measurement Company: Method 5 Data Sheet

EMCo Job #:	Pr 15-01	Operator(s):	WS, MC
Client:	Pacificoff	Barometric pressure ("Hg):	23.3
Source:	Huntington 1	Static pressure ("H ₂ O):	-2.7
Date:	12/13/15	Leak Check ("H ₂ O @ Vac):	0.00@ 18"
Run #	2	Leak Check ("H ₂ O @ Vac):	0.00@ 12"
Meterbox ID:	M5-1	Pitot ID / Coeff:	0.89
Meterbox Y =	1621	ΔH@ =	1.79
O ₂ %:	7.1	Pitot Leak Check:	✓
CO ₂ %:	11	Nozzle Diameter:	0.183
Start Time	1015	K Factor:	0.88
		Stop Time	1225

Impinger Weights (x.x g)	Initial	Final
Impinger 1		
Impinger 2		
Impinger 3		
Impinger 4 (SG)		
Total	774.2	979.2
Total	198.0	
Filter ID:	734	205
Tin ID:	1338	

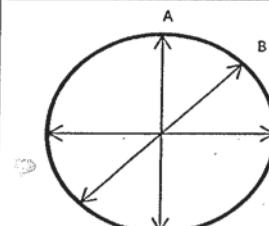
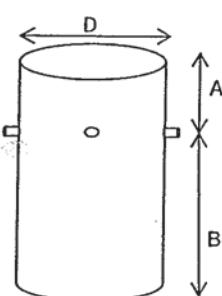
Traverse Point	Sample Time	Stack Temp (°F)	Probe Temp (°F)	Filter Temp (°F)	Velocity Δp ("H ₂ O)	Orifice Pressure ΔH ("H ₂ O)	Vacuum ("Hg)	Sample Volume (ft ³)	DGM Temp (°F) Inlet	DGM Temp (°F) Outlet	Imp. Outlet Temp (°F)
								176.373			
1	10	106	302	320	2.3	2.0	6	184.9	52	47	39
1-2	20	105	304	320	2.4	2.1	7	193.8	58	47	45
1-3	30	106	304	322	2.4	2.1	7	202.6	60	48	51
2-1	40	106	300	322	2.4	2.1	8	211.2	60	49	50
2-2	50	106	305	320	2.5	2.2	8	220.4	59	49	51
2-3	60	106	300	320	2.5	2.2	8	229.1	57	50	52
3-1	70	106	303	321	2.4	2.1	7	238.9	59	50	55
3-2	80	105	301	321	2.4	2.1	7	247.0	60	50	57
3-3	90	106	300	323	2.5	2.2	8	256.8	58	50	56
4-1	100	106	302	322	2.3	2.0	7	263.9	59	50	59
4-2	110	106	301	320	2.3	2.0	7	272.5	60	51	62
4-3	120	106	305	320	2.3	2.0	7	281.091	60	51	63
12	120	(106)	300	320	(5463)	(2.092)	8	(104.724)	(53)		63
Total	Total	Average	Minimum	Minimum	Avg VΔp	Average	Max.	Total	Average		Maximum

Stack Schematic

Stack Diameter (D)=

Distance A=

Distance B=



Nozzle Calibration

A= .183

B= .183

C= .183

Average = .183

Max Difference = 0

(Must be < 0.004 in.)

Emissions Measurement Company: Method 5 Data Sheet

EMCo Job #:	P 15-01	Operator(s):	WS, ML
Client:	CALIFORNIA	Barometric pressure ("Hg):	23.3
Source:	HUNTINGTON 1	Static pressure ("H ₂ O):	-2.7
Date:	12/15/15	Leak Check ("H ₂ O @ Vac):	0.00 @ 12"
Run #	3	Leak Check ("H ₂ O @ Vac):	0.00 @ 15"
Meterbox ID:	M5-2	Pitot ID / Coeff:	084
Meterbox Y =	96.1	Pitot Leak Check:	✓
O ₂ %:	7.1	Nozzle Diameter:	0.183
CO ₂ %:		K Factor:	0.89
Start Time	1317	Stop Time	1521

Impinger Weights (x.g)	Initial	Final
Impinger 1		
Impinger 2		
Impinger 3		
Impinger 4 (SG)		
Total	770.6	965.4
	Total	(194.8)

Filter ID: 737
Tin ID: 1333

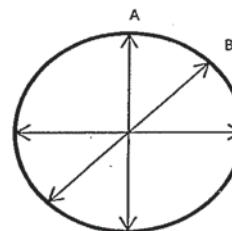
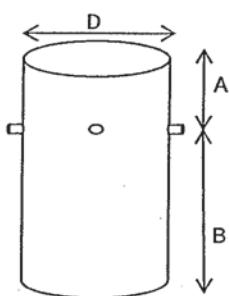
Traverse Point	Sample Time	Stack Temp (°F)	Probe Temp (°F)	Filter Temp (°F)	Velocity ΔP ("H ₂ O)	Orifice Pressure ΔH ("H ₂ O)	Vacuum ("Hg)	Sample Volume (ft ³)	DGM Temp (°F) Inlet	DGM Temp (°F) Outlet	Imp. Outlet Temp (°F)
								281,262			
1-1	10	106	310	322	2.3	2.0	8	289.7	54	48	40
1-2	20	106	315	320	2.6	2.3	10	298.4	55	49	52
1-3	30	106	303	321	2.7	2.4	11	307.9	58	49	56
2-1	40	106	309	320	2.0	1.8	9	317.3	58	49	54
2-2	50	105	310	319	2.3	2.0	10	326.5	58	49	53
2-3	60	107	307	318	2.5	2.2	10	335.8	59	49	51
3-1	70	106	300	321	2.6	2.3	10	344.2	54	49	50
3-2	80	106	302	320	2.5	2.0	10	354.1	54	49	46
3-3	90	105	303	320	2.5	2.2	10	358.5	54	49	46
4-1	100	106	301	319	2.3	2.0	10	367.6	55	49	49
4-2	110	105	304	320	2.5	2.2	10	376.0	55	49	49
4-3	120	106	303	320	2.5	2.2	10	384.958	55	49	49
12	120	(106)	300	318	(1.5625)	(2.15)	11	(103,696)	(52)		56
Total	Total	Average	Minimum	Minimum	Avg. ΔP	Average	Max.	Total	Average		Maximum

Stack Schematic

Stack Diameter (D)=

Distance A=

Distance B=



Nozzle Calibration

A=

B=

C=

Average =

Max Difference =

(Must be < 0.004 in.)



Project PC15-0001.18
Appendix C: Lab Data
Gravimetric Analysis

Project Code:	PC15-1.18
Date Finalized:	12/29/2015
Analyst:	Parks

Laboratory Results Summary	
Sample ID	Filterable Particulate Matter (mg)
Huntington 1, Run #1	11.2
Huntington 1, Run #2	12.1
Huntington 1, Run #3	8.6

No blank corrections were performed.

Analytical Narrative

Quartz fiber filters were dessicated and tared to a constant weight in the EMCo laboratory prior to sampling. Following testing, the filters were dessicated for at least 24 hours, then weighed to a constant weight (± 0.5 mg). The acetone rinses were measured to the nearest milliliter, transferred to tared aluminum weighing dishes, taken to dryness under a fume hood, then weighed to a constant weight (± 0.5 mg). Each result above represents total filterable particulate matter for each test run (acetone rinse + filter catch), with no blank correction performed unless otherwise indicated.

Instrumentation

All measurements were taken using a Torbal Model AGCN200 Analytical Balance under laboratory conditions. The instrument is auto-calibrated and challenged with three NIST-traceable reference weights daily.

Detection Limit / Sensitivity

All measurements are recorded to 0.0001g (0.1mg).

Notes

No deviations from the analytical procedure from EPA Method 5 were noted. All samples were received in good condition. After analysis, all samples are archived for a period of one year.

Attachments

Gravimetric Analysis Logs

Sample Chain of Custody



EPA Method 5 Gravimetric Analysis Log

Project Code: PC15-1.18

Unit ID: Huntington 1

Front-Half Particulate Matter Filter Catch

Filter #	Run #1		Run #2		Run #3	
	Date	Weight (g)	Date	Weight (g)	Date	Weight (g)
Final Weight	12/29/15	0.3561	12/29/15	0.3570	12/29/15	0.3581
Tare Weight (g)	2/18/15	0.3526	2/18/15	0.3521	2/18/15	0.3552
Filter Catch (g)		0.0035		0.0049		0.0029

Front-Half Particulate Matter Acetone Rinse Catch

Dish #	Run #1		Run #2		Run #3		Blank	
	Date	Weight (g)						
Final Weight	12/29/15	6.3980	12/29/15	6.3352	12/29/15	6.3918	12/29/15	6.3647
Tare Weight (g)	9/30/15	6.3903	9/30/15	6.3280	9/30/15	6.3861	9/30/15	6.3650
Total Rinse Catch (g)		0.0077		0.0072		0.0057		-0.0003

Total Particulate Catch

	Run #1	Run #2	Run #3
Filter Catch (g)	0.0035	0.0049	0.0029
+ Rinse Catch (g)	0.0077	0.0072	0.0057
- Acetone Blank (g)	0.0000	0.0000	0.0000
Total PM (g)	0.0112	0.0121	0.0086

Laboratory Chain of Custody Record

Project Code:	PC 15-01		
Client:	Pacificorp		
Facility:	Huntington 182		
Unit:	182		
Sample Date(s):	12/15-16/15		
Project Manager:	Mike Corrigan		
Sample ID / Run #	Filter ID	Tin ID	Notes
U2 R1	832	1334	
12/16/15 R2	836	1339	
" R3	845	1340	
U1 R1	738	1337	
12/15/15 R2	734	1338	
" R3	737	1333	
A Blank		1336	
Relinquished by:	Mike Corrigan M		Date: 12/16/15
Received by:	MP		Date 12/17



Project PC15-0001.18
Appendix D: CEMS Data
CEMS Printouts for Test Runs

Average Data

Plant: HUNTINGTON PLANT

Interval: 1 Minute

Type: Block

Report Period: 12/15/2015 07:26 Through 12/15/2015 09:36

Time Online Criteria: 1 minute(s)

Source Parameter Unit	UNIT1				
	BARPRESS (INHG)	CO2 (PCT)	OPACITY (PCT)	STKTEMP (DEGF)	UNITLOAD (MW)
12/15/15 07:26	23.317	11.0	2.4	94.89	460
12/15/15 07:27	23.317	11.0	2.4	94.64	463
12/15/15 07:28	23.318	10.9	2.4	95.05	467
12/15/15 07:29	23.318	10.9	2.4	95.34	471
12/15/15 07:30	23.318	10.8	2.4	95.67	474
12/15/15 07:31	23.319	10.9	2.4	95.83	475
12/15/15 07:32	23.320	10.9	2.4	95.58	477
12/15/15 07:33	23.320	10.9	2.4	95.25	477
12/15/15 07:34	23.321	10.9	2.4	95.37	478
12/15/15 07:35	23.321	10.9	2.4	95.61	479
12/15/15 07:36	23.319	10.9	2.4	95.93	480
12/15/15 07:37	23.321	10.9	2.4	95.91	480
12/15/15 07:38	23.320	10.8	2.3	95.63	480
12/15/15 07:39	23.319	10.8	2.4	96.01	478
12/15/15 07:40	23.320	10.7	2.4	96.43	476
12/15/15 07:41	23.320	10.7	2.4	96.00	474
12/15/15 07:42	23.320	10.8	2.3	95.78	474
12/15/15 07:43	23.320	10.7	2.3	96.14	474
12/15/15 07:44	23.320	10.7	2.3	96.25	474
12/15/15 07:45	23.322	10.6	2.3	95.90	474
12/15/15 07:46	23.321	10.7	2.3	95.37	473
12/15/15 07:47	23.322	10.7	2.4	95.05	472
12/15/15 07:48	23.322	10.7	2.4	95.47	473
12/15/15 07:49	23.322	10.8	2.4	95.60	474
12/15/15 07:50	23.323	10.8	2.3	95.68	476
12/15/15 07:51	23.324	10.8	2.4	95.62	477
12/15/15 07:52	23.322	10.8	2.3	95.17	477
12/15/15 07:53	23.322	10.8	2.4	95.18	475
12/15/15 07:54	23.322	10.7	2.4	95.80	474
12/15/15 07:55	23.323	10.7	2.3	95.54	474
12/15/15 07:56	23.324	10.7	2.4	95.41	476
12/15/15 07:57	23.323	10.8	2.4	94.68	476
12/15/15 07:58	23.326	10.9	2.4	94.16	476
12/15/15 07:59	23.326	10.8	2.4	94.34	478
12/15/15 08:00	23.325	10.7	2.4	94.65	477
12/15/15 08:01	23.326	10.7	2.4	94.87	476
12/15/15 08:02	23.328	10.7	2.4	95.38	474
12/15/15 08:03	23.329	10.7	2.4	95.68	474
12/15/15 08:04	23.329	10.6	2.4	95.55	473
12/15/15 08:05	23.329	7.5 I	2.4	95.14	472
12/15/15 08:06	23.331	8.2 I	2.4	94.93	472
12/15/15 08:07	23.329	10.7 I	2.4	95.01	473
12/15/15 08:08	23.330	10.8 I	2.4	94.39	475
12/15/15 08:09	23.329	10.9	2.4	93.49	477
12/15/15 08:10	23.330	10.9	2.4	93.30	479
12/15/15 08:11	23.329	10.9	2.4	93.08	481

C = Calibration

S = Substituted

* = Suspect

U = Startup

Report Version 4.0

HTNDAHS

F = Unit Offline

E = Exceedance

M = Maintenance

T = Out Of Control

Report Generated 12/29/15 1:15:12 Huntington 1 Q4 PM

Page 19 of 32

Average Data

Plant: HUNTINGTON PLANT

Interval: 1 Minute

Type: Block

Report Period: 12/15/2015 07:26 Through 12/15/2015 09:36

Time Online Criteria: 1 minute(s)

12/15/15	08:12	23.329	10.9	2.3	93.94	480
12/15/15	08:13	23.330	10.8	2.4	94.10	478
12/15/15	08:14	23.331	10.7	2.4	94.15	476
12/15/15	08:15	23.332	10.8	2.3	94.18	473
12/15/15	08:16	23.330	10.7	2.4	93.80	470
12/15/15	08:17	23.331	10.7	2.4	93.63	468
12/15/15	08:18	23.331	10.6	2.4	94.25	469
12/15/15	08:19	23.333	10.6	2.4	94.08	470
12/15/15	08:20	23.333	10.7	2.4	93.78	472
12/15/15	08:21	23.332	10.8	2.4	93.96	473
12/15/15	08:22	23.334	10.9	2.4	94.19	476
12/15/15	08:23	23.333	10.8	2.4	93.79	477
12/15/15	08:24	23.334	10.8	2.4	93.76	478
12/15/15	08:25	23.334	10.8	2.4	93.45	477
12/15/15	08:26	23.335	10.9	2.4	93.68	475
12/15/15	08:27	23.337	10.7	2.4	93.95	473
12/15/15	08:28	23.337	10.7	2.4	94.13	472
12/15/15	08:29	23.338	10.7	2.4	94.08	474
12/15/15	08:30	23.338	10.9	2.4	93.58	475
12/15/15	08:31	23.339	10.9	2.4	93.42	477
12/15/15	08:32	23.339	10.9	2.4	93.70	477
12/15/15	08:33	23.340	10.8	2.3	94.10	477
12/15/15	08:34	23.340	10.8	2.4	93.86	477
12/15/15	08:35	23.341	10.8	2.4	93.54	476
12/15/15	08:36	23.341	10.7	2.4	93.75	474
12/15/15	08:37	23.342	10.7	2.4	94.08	474
12/15/15	08:38	23.343	10.7	2.4	94.53	475
12/15/15	08:39	23.343	10.8	2.4	94.81	473
12/15/15	08:40	23.343	10.7	2.4	95.05	473
12/15/15	08:41	23.345	10.7	2.4	94.51	473
12/15/15	08:42	23.344	10.8	2.4	93.92	473
12/15/15	08:43	23.346	10.8	2.4	93.83	473
12/15/15	08:44	23.346	10.8	2.4	93.70	473
12/15/15	08:45	23.345	10.8	2.4	93.77	474
12/15/15	08:46	23.344	10.8	2.4	93.90	474
12/15/15	08:47	23.344	10.8	2.4	94.10	475
12/15/15	08:48	23.346	10.7	2.4	93.84	476
12/15/15	08:49	23.346	10.8	2.4	93.26	476
12/15/15	08:50	23.346	10.9	2.4	93.45	475
12/15/15	08:51	23.346	10.8	2.4	94.51	475
12/15/15	08:52	23.345	10.8	2.4	95.15	474
12/15/15	08:53	23.345	10.8	2.4	95.27	476
12/15/15	08:54	23.346	10.8	2.4	95.09	477
12/15/15	08:55	23.347	10.8	2.4	94.53	479
12/15/15	08:56	23.347	10.9	2.4	94.52	477
12/15/15	08:57	23.348	10.8	2.4	95.32	478

F = Unit Offline

E = Exceedance

M = Maintenance

T = Out Of Control

Report Generated 12/29/15 1:15:12 Huntington 1 Q4 PM

C = Calibration

S = Substituted

* = Suspect

U = Startup

Report Version 4.0

HTNDAHS

Page 20 of 32

Average Data

Plant: HUNTINGTON PLANT

Interval: 1 Minute

Type: Block

Report Period: 12/15/2015 07:26 Through 12/15/2015 09:36

Time Online Criteria: 1 minute(s)

12/15/15	08:58	23.348	10.7	2.4	95.89	477
12/15/15	08:59	23.347	10.8	2.4	94.84	477
12/15/15	09:00	23.348	10.8	2.3	95.25	474
12/15/15	09:01	23.350	10.8	2.3	95.55	472
12/15/15	09:02	23.350	10.7	2.4	96.16	471
12/15/15	09:03	23.348	10.6	2.4	96.66	470
12/15/15	09:04	23.350	10.6	2.4	96.57	471
12/15/15	09:05	23.350	10.6	2.4	95.90	472
12/15/15	09:06	23.351	10.7	2.4	95.54	474
12/15/15	09:07	23.351	10.8	2.4	95.82	475
12/15/15	09:08	23.353	10.7	2.4	95.60	477
12/15/15	09:09	23.354	10.9	2.4	95.24	479
12/15/15	09:10	23.355	10.8	2.4	95.36	477
12/15/15	09:11	23.354	10.8	2.4	94.99	476
12/15/15	09:12	23.353	10.8	2.4	95.15	474
12/15/15	09:13	23.354	10.7	2.3	95.55	474
12/15/15	09:14	23.353	10.7	2.3	95.29	472
12/15/15	09:15	23.354	10.6	2.3	94.72	471
12/15/15	09:16	23.353	10.6	2.4	94.64	472
12/15/15	09:17	23.353	10.7	2.3	94.97	473
12/15/15	09:18	23.354	10.8	2.4	94.98	475
12/15/15	09:19	23.354	10.9	2.4	94.49	477
12/15/15	09:20	23.353	10.9	2.4	94.00	477
12/15/15	09:21	23.353	10.9	2.4	94.34	478
12/15/15	09:22	23.355	10.8	2.3	94.64	476
12/15/15	09:23	23.356	10.8	2.4	94.51	475
12/15/15	09:24	23.355	10.7	2.3	94.36	474
12/15/15	09:25	23.354	10.7	2.3	94.63	475
12/15/15	09:26	23.355	10.8	2.3	94.77	475
12/15/15	09:27	23.355	10.8	2.4	95.05	476
12/15/15	09:28	23.354	10.8	2.3	95.25	477
12/15/15	09:29	23.354	10.8	2.4	95.06	475
12/15/15	09:30	23.356	10.7	2.4	94.39	475
12/15/15	09:31	23.357	10.8	2.4	94.15	475
12/15/15	09:32	23.358	10.8	2.4	94.21	474
12/15/15	09:33	23.357	10.8	2.4	94.85	475
12/15/15	09:34	23.358	10.7	2.4	95.59	477
12/15/15	09:35	23.360	10.8	2.4	95.93	477
12/15/15	09:36	23.359	10.9	2.4	95.77	475

Average	23.338	10.8	2.4	94.81	475
Minimum	23.317	10.6	2.3	93.08	460
Maximum	23.360	11.0	2.4	96.66	481
Summation	3,057,261	1,369.0	312.1	12,420.40	62,192

Included Data Points	131	127	131	131	131
Total number of Data Points	131	131	131	131	131

C = Calibration

S = Substituted

* = Suspect

U = Startup

Report Version 4.0

HTNDAHS

F = Unit Offline

E = Exceedance

M = Maintenance

T = Out Of Control

Report Generated 12/29/15 1:15:12 Huntington 1 Q4 PM

Average Data

Plant: HUNTINGTON PLANT

Interval: 1 Minute

Type: Block

Report Period: 12/15/2015 10:15 Through 12/15/2015 12:25

Time Online Criteria: 1 minute(s)

Source Parameter Unit	UNIT1				
	BARPRESS (INHG)	CO2 (PCT)	OPACITY (PCT)	STKTEMP (DEGF)	UNITLOAD (MW)
12/15/15 10:15	23.374	10.8	2.3	96.33	475
12/15/15 10:16	23.376	10.8	2.3	96.11	476
12/15/15 10:17	23.376	10.8	2.3	95.92	476
12/15/15 10:18	23.377	10.8	2.3	96.17	477
12/15/15 10:19	23.379	10.9	2.3	96.12	476
12/15/15 10:20	23.379	10.8	2.3	96.23	475
12/15/15 10:21	23.380	10.7	2.3	96.41	475
12/15/15 10:22	23.381	10.7	2.3	97.04	474
12/15/15 10:23	23.383	10.6	2.3	96.74	474
12/15/15 10:24	23.383	10.7	2.3	95.97	475
12/15/15 10:25	23.382	10.8	2.3	95.76	475
12/15/15 10:26	23.383	10.9	2.3	96.23	475
12/15/15 10:27	23.385	10.8	2.3	96.39	475
12/15/15 10:28	23.384	10.8	2.4	95.78	475
12/15/15 10:29	23.384	10.8	2.3	95.94	475
12/15/15 10:30	23.385	10.8	2.3	96.33	475
12/15/15 10:31	23.387	10.8	2.3	96.64	475
12/15/15 10:32	23.387	10.7	2.3	96.43	475
12/15/15 10:33	23.387	10.8	2.3	96.05	474
12/15/15 10:34	23.388	10.8	2.3	95.80	473
12/15/15 10:35	23.388	10.7	2.3	96.80	473
12/15/15 10:36	23.389	10.7	2.3	97.00	474
12/15/15 10:37	23.391	10.8	2.3	96.19	474
12/15/15 10:38	23.389	10.8	2.3	95.69	475
12/15/15 10:39	23.390	10.8	2.3	95.32	477
12/15/15 10:40	23.391	10.9	2.3	95.25	479
12/15/15 10:41	23.391	11.0	2.3	95.13	481
12/15/15 10:42	23.392	11.0	2.3	95.29	483
12/15/15 10:43	23.392	10.9	2.3	95.63	482
12/15/15 10:44	23.394	10.8	2.3	95.76	480
12/15/15 10:45	23.395	10.8	2.3	96.34	478
12/15/15 10:46	23.394	10.8	2.3	96.70	474
12/15/15 10:47	23.394	10.7	2.3	97.10	472
12/15/15 10:48	23.396	10.6	2.3	96.86	473
12/15/15 10:49	23.395	10.7	2.3	96.33	473
12/15/15 10:50	23.397	10.8	2.3	95.67	474
12/15/15 10:51	23.398	10.9	2.3	95.75	472
12/15/15 10:52	23.396	10.7	2.3	96.62	473
12/15/15 10:53	23.396	10.7	2.3	97.12	472
12/15/15 10:54	23.397	10.7	2.3	96.43	471
12/15/15 10:55	23.397	10.8	2.3	95.77	471
12/15/15 10:56	23.397	10.8	2.3	96.12	471
12/15/15 10:57	23.398	10.7	2.3	97.06	473
12/15/15 10:58	23.398	10.7	2.3	96.57	476
12/15/15 10:59	23.398	10.8	2.3	95.57	477
12/15/15 11:00	23.399	10.9	2.3	95.85	476
12/15/15 11:01	23.399	10.8	2.3	96.73	474

C = Calibration

S = Substituted

* = Suspect

U = Startup

Report Version 4.0

HTNDAHS

F = Unit Offline

E = Exceedance

M = Maintenance

T = Out Of Control

Report Generated 12/15/15 15:15 Huntington 1 Q4 PM

Page 22 of 32

Average Data

Plant: HUNTINGTON PLANT

Interval: 1 Minute

Type: Block

Report Period: 12/15/2015 10:15 Through 12/15/2015 12:25

Time Online Criteria: 1 minute(s)

12/15/15	11:02	23.399	10.7	2.3	97.05	473
12/15/15	11:03	23.399	10.7	2.3	96.88	472
12/15/15	11:04	23.399	10.7	2.3	96.78	472
12/15/15	11:05	23.399	10.8	2.3	96.07	474
12/15/15	11:06	23.400	10.8	2.3	96.08	475
12/15/15	11:07	23.399	10.8	2.3	95.79	476
12/15/15	11:08	23.400	10.8	2.3	95.22	479
12/15/15	11:09	23.400	10.9	2.3	95.13	482
12/15/15	11:10	23.400	11.0	2.3	95.87	482
12/15/15	11:11	23.399	10.8	2.3	96.79	480
12/15/15	11:12	23.399	10.8	2.3	96.90	478
12/15/15	11:13	23.401	10.8	2.3	96.44	476
12/15/15	11:14	23.401	10.8	2.3	96.46	474
12/15/15	11:15	23.401	10.7	2.3	96.76	473
12/15/15	11:16	23.402	10.8	2.3	96.42	473
12/15/15	11:17	23.402	10.8	2.3	96.46	473
12/15/15	11:18	23.401	10.8	2.3	97.01	472
12/15/15	11:19	23.402	10.7	2.3	97.31	473
12/15/15	11:20	23.403	10.7	2.3	97.44	474
12/15/15	11:21	23.401	10.8	2.3	96.55	474
12/15/15	11:22	23.401	10.8	2.3	96.00	474
12/15/15	11:23	23.402	10.8	2.3	96.44	473
12/15/15	11:24	23.402	10.7	2.3	96.76	473
12/15/15	11:25	23.401	10.7	2.3	96.81	474
12/15/15	11:26	23.401	10.8	2.3	96.74	474
12/15/15	11:27	23.401	10.8	2.3	96.64	473
12/15/15	11:28	23.401	10.7	2.3	97.15	474
12/15/15	11:29	23.401	10.7	2.3	97.76	472
12/15/15	11:30	23.401	10.7	2.3	97.56	472
12/15/15	11:31	23.401	10.7	2.3	96.64	473
12/15/15	11:32	23.401	10.8	2.3	96.03	474
12/15/15	11:33	23.402	10.9	2.3	95.60	476
12/15/15	11:34	23.401	10.9	2.3	95.98	477
12/15/15	11:35	23.401	10.9	2.3	96.76	478
12/15/15	11:36	23.401	10.8	2.3	97.26	478
12/15/15	11:37	23.401	10.7	2.3	97.10	477
12/15/15	11:38	23.401	10.7	2.3	97.06	475
12/15/15	11:39	23.402	10.8	2.3	96.90	474
12/15/15	11:40	23.400	10.8	2.3	96.83	473
12/15/15	11:41	23.400	10.8	2.3	97.25	473
12/15/15	11:42	23.401	10.8	2.3	97.37	474
12/15/15	11:43	23.400	10.8	2.3	97.16	473
12/15/15	11:44	23.399	10.7	2.3	97.45	475

F = Unit Offline

E = Exceedance

M = Maintenance

T = Out Of Control

Report Generated 12/29/15 15:15 Huntington 1 Q4 PM

C = Calibration

S = Substituted

* = Suspect

U = Startup

Report Version 4.0

HTNDAHS

Page 23 of 32

Average Data

Plant: HUNTINGTON PLANT

Interval: 1 Minute

Type: Block

Report Period: 12/15/2015 10:15 Through 12/15/2015 12:25

Time Online Criteria: 1 minute(s)

12/15/15	11:45	23.400	10.7	2.3	97.18	478
12/15/15	11:46	23.400	10.9	2.3	97.02	477
12/15/15	11:47	23.400	10.8	2.3	97.66	478
12/15/15	11:48	23.399	10.8	2.3	96.96	477
12/15/15	11:49	23.400	10.8	2.3	96.67	475
12/15/15	11:50	23.400	10.7	2.3	96.66	474
12/15/15	11:51	23.400	10.8	2.3	96.93	474
12/15/15	11:52	23.399	10.8	2.3	97.01	473
12/15/15	11:53	23.400	10.8	2.3	96.80	473
12/15/15	11:54	23.401	10.8	2.3	96.52	473
12/15/15	11:55	23.401	10.8	2.3	96.13	477
12/15/15	11:56	23.401	10.9	2.3	95.88	479
12/15/15	11:57	23.401	10.9	2.3	96.05	479
12/15/15	11:58	23.401	10.9	2.3	96.74	479
12/15/15	11:59	23.402	10.8	2.3	96.84	478
12/15/15	12:00	23.402	10.8	2.3	97.26	477
12/15/15	12:01	23.402	10.8	2.3	97.42	476
12/15/15	12:02	23.402	10.8	2.3	96.94	475
12/15/15	12:03	23.403	10.8	2.3	96.82	475
12/15/15	12:04	23.402	10.8	2.3	96.48	474
12/15/15	12:05	23.402	7.5	2.3	96.55	475
12/15/15	12:06	23.403	8.0	2.3	96.65	476
12/15/15	12:07	23.402	10.8	2.3	95.84	476
12/15/15	12:08	23.402	10.9	2.3	96.65	476
12/15/15	12:09	23.402	10.8	2.3	96.77	476
12/15/15	12:10	23.402	10.8	2.3	96.50	476
12/15/15	12:11	23.402	10.8	2.3	96.72	475
12/15/15	12:12	23.403	10.7	2.3	96.99	474
12/15/15	12:13	23.403	10.7	2.3	96.82	476
12/15/15	12:14	23.404	10.7	2.3	96.76	474
12/15/15	12:15	23.403	10.8	2.3	96.91	471
12/15/15	12:16	23.401	10.7	2.3	97.04	471
12/15/15	12:17	23.402	10.7	2.3	96.97	472
12/15/15	12:18	23.401	10.8	2.3	97.10	471
12/15/15	12:19	23.402	10.8	2.3	97.44	471
12/15/15	12:20	23.402	10.7	2.3	97.12	471
12/15/15	12:21	23.401	10.8	2.3	96.53	473
12/15/15	12:22	23.401	10.8	2.3	96.82	476
12/15/15	12:23	23.401	10.7	2.3	96.78	478
12/15/15	12:24	23.401	10.9	2.3	96.65	479
12/15/15	12:25	23.401	10.8	2.3	97.21	479

Average	23.397	10.8	2.3	96.54	475
Minimum	23.374	10.6	2.3	95.13	471
Maximum	23.404	11.0	2.4	97.76	483
Summation	3,064.977	1,369.6	301.4	12,646.49	62,229

Included Data Points	131	127	131	131
Total number of Data Points	131	131	131	131

C = Calibration

S = Substituted

* = Suspect

U = Startup

Report Version 4.0

HTNDAHS

F = Unit Offline

E = Exceedance

M = Maintenance

T = Out Of Control

Report Generated 12/29/15 15:15 Huntington 1 Q4 PM

Page 24 of 32

Average Data

Plant: HUNTINGTON PLANT

Interval: 1 Minute

Type: Block

Report Period: 12/15/2015 13:17 Through 12/15/2015 15:21

Time Online Criteria: 1 minute(s)

Source Parameter Unit	UNIT1				
	BARPRESS (INHG)	CO2 (PCT)	OPACITY (PCT)	STKTEMP (DEGF)	UNITLOAD (MW)
12/15/15 13:17	23.410	10.8	2.3	98.32	476
12/15/15 13:18	23.411	10.8	2.3	98.37	478
12/15/15 13:19	23.411	10.8	2.3	97.98	479
12/15/15 13:20	23.412	10.8	2.3	98.06	479
12/15/15 13:21	23.413	10.8	2.3	98.17	479
12/15/15 13:22	23.411	10.8	2.3	97.62	479
12/15/15 13:23	23.410	10.8	2.3	96.98	477
12/15/15 13:24	23.411	10.8	2.3	97.93	474
12/15/15 13:25	23.412	10.7	2.3	98.58	473
12/15/15 13:26	23.412	10.7	2.3	98.54	473
12/15/15 13:27	23.413	10.7	2.3	98.32	472
12/15/15 13:28	23.413	10.7	2.3	97.88	471
12/15/15 13:29	23.411	10.7	2.3	97.59	472
12/15/15 13:30	23.412	10.7	2.3	97.61	472
12/15/15 13:31	23.415	10.7	2.3	97.23	474
12/15/15 13:32	23.415	10.9	2.3	96.96	474
12/15/15 13:33	23.414	10.8	2.3	97.32	475
12/15/15 13:34	23.414	10.8	2.3	97.32	476
12/15/15 13:35	23.415	10.8	2.3	97.68	476
12/15/15 13:36	23.414	10.8	2.3	97.37	476
12/15/15 13:37	23.415	10.8	2.3	97.72	478
12/15/15 13:38	23.416	10.8	2.3	98.31	478
12/15/15 13:39	23.415	10.8	2.3	98.09	478
12/15/15 13:40	23.414	10.8	2.3	97.44	476
12/15/15 13:41	23.416	10.8	2.3	97.29	476
12/15/15 13:42	23.415	10.7	2.3	97.21	476
12/15/15 13:43	23.413	10.8	2.3	97.02	476
12/15/15 13:44	23.413	10.8	2.3	97.25	475
12/15/15 13:45	23.414	10.8	2.3	97.67	474
12/15/15 13:46	23.414	10.8	2.3	97.68	475
12/15/15 13:47	23.412	10.7	2.3	97.77	473
12/15/15 13:48	23.414	10.8	2.3	97.74	472
12/15/15 13:49	23.414	10.8	2.3	97.60	472
12/15/15 13:50	23.413	10.8	2.3	97.59	475
12/15/15 13:51	23.411	10.8	2.3	97.46	477
12/15/15 13:52	23.412	10.8	2.3	97.94	478
12/15/15 13:53	23.412	10.8	2.3	98.79	479
12/15/15 13:54	23.411	10.7	2.3	99.08	478
12/15/15 13:55	23.411	10.8	2.3	97.52	476
12/15/15 13:56	23.412	10.8	2.3	97.40	475
12/15/15 13:57	23.412	10.8	2.3	97.45	474
12/15/15 13:58	23.411	10.7	2.3	97.30	474
12/15/15 13:59	23.411	10.8	2.3	97.07	475

C = Calibration

S = Substituted

* = Suspect

U = Startup

Report Version 4.0

HTNDAHS

F = Unit Offline

E = Exceedance

M = Maintenance

T = Out Of Control

Report Generated: 12/29/15 15:14

Page 25 of 32

Average Data

Plant: HUNTINGTON PLANT

Interval: 1 Minute

Type: Block

Report Period: 12/15/2015 13:17 Through 12/15/2015 15:21

Time Online Criteria: 1 minute(s)

12/15/15	14:00	23.410	10.9	2.3	97.34	474
12/15/15	14:01	23.410	10.8	2.3	97.96	473
12/15/15	14:02	23.411	10.7	2.3	97.53	474
12/15/15	14:03	23.411	10.7	2.3	97.44	475
12/15/15	14:04	23.411	10.7	2.3	97.33	476
12/15/15	14:05	23.410	10.8	2.3	96.96	475
12/15/15	14:06	23.411	10.8	2.3	97.28	476
12/15/15	14:07	23.411	10.8	2.3	97.69	477
12/15/15	14:08	23.411	10.9	2.3	97.21	478
12/15/15	14:09	23.411	10.9	2.3	97.14	477
12/15/15	14:10	23.410	10.8	2.3	97.37	477
12/15/15	14:11	23.410	10.8	2.3	97.42	477
12/15/15	14:12	23.412	10.8	2.3	97.68	475
12/15/15	14:13	23.411	10.7	2.3	97.22	474
12/15/15	14:14	23.411	10.7	2.3	96.49	475
12/15/15	14:15	23.411	10.7	2.3	97.00	475
12/15/15	14:16	23.411	10.7	2.3	97.59	473
12/15/15	14:17	23.413	10.8	2.3	97.91	472
12/15/15	14:18	23.413	10.7	2.3	98.07	472
12/15/15	14:19	23.412	10.7	2.3	97.44	474
12/15/15	14:20	23.413	10.8	2.3	97.19	475
12/15/15	14:21	23.413	10.9	2.3	97.26	477
12/15/15	14:22	23.413	10.9	2.3	96.98	478
12/15/15	14:23	23.413	10.9	2.3	96.68	479
12/15/15	14:24	23.414	10.9	2.3	96.86	478
12/15/15	14:25	23.413	10.8	2.3	97.24	476
12/15/15	14:26	23.413	10.7	2.3	97.76	475
12/15/15	14:27	23.413	10.6	2.3	97.97	473
12/15/15	14:28	23.413	10.7	2.3	98.02	470
12/15/15	14:29	23.413	10.6	2.3	98.18	469
12/15/15	14:30	23.413	10.6	2.3	98.38	468
12/15/15	14:31	23.415	10.5	2.3	98.04	470
12/15/15	14:32	23.415	10.6	2.3	97.55	472
12/15/15	14:33	23.413	10.7	2.3	97.03	474
12/15/15	14:34	23.414	10.9	2.3	96.66	475
12/15/15	14:35	23.416	10.9	2.3	97.12	475
12/15/15	14:36	23.417	10.8	2.3	97.40	476
12/15/15	14:37	23.417	10.9	2.3	96.88	477
12/15/15	14:38	23.416	10.9	2.3	96.96	477
12/15/15	14:39	23.416	10.7	2.3	97.17	476
12/15/15	14:40	23.417	10.7	2.3	97.41	477
12/15/15	14:41	23.415	10.8	2.3	97.52	477
12/15/15	14:42	23.416	10.8	2.3	97.52	476
12/15/15	14:43	23.417	10.8	2.3	97.46	475
12/15/15	14:44	23.417	10.8	2.3	97.45	475
12/15/15	14:45	23.418	10.8	2.3	97.45	476
12/15/15	14:46	23.417	10.8	2.3	97.18	476

C = Calibration

S = Substituted

* = Suspect

U = Startup

Report Version 4.0

HTNDAHS

F = Unit Offline

E = Exceedance

M = Maintenance

T = Out Of Control

Report Generated: 12/29/15 15:14
Huntington 1 Q4 PM

Average Data

Plant: HUNTINGTON PLANT

Interval: 1 Minute

Type: Block

Report Period: 12/15/2015 13:17 Through 12/15/2015 15:21

Time Online Criteria: 1 minute(s)

12/15/15	14:47	23.417	10.9	2.3	96.94	476
12/15/15	14:48	23.417	10.8	2.3	97.05	478
12/15/15	14:49	23.417	10.8	2.3	97.25	479
12/15/15	14:50	23.419	10.9	2.3	97.56	479
12/15/15	14:51	23.418	10.9	2.3	97.91	477
12/15/15	14:52	23.418	10.7	2.3	97.85	477
12/15/15	14:53	23.419	10.8	2.3	98.04	476
12/15/15	14:54	23.420	10.7	2.3	98.58	475
12/15/15	14:55	23.420	10.6	2.3	99.27	473
12/15/15	14:56	23.421	10.6	2.3	99.35	471
12/15/15	14:57	23.421	10.6	2.3	99.24	471
12/15/15	14:58	23.421	10.6	2.3	99.37	472
12/15/15	14:59	23.421	10.7	2.3	99.43	473
12/15/15	15:00	23.422	10.7	2.3	98.97	474
12/15/15	15:01	23.421	10.9	2.3	99.04	474
12/15/15	15:02	23.423	10.8	2.3	98.46	475
12/15/15	15:03	23.422	10.8	2.3	98.15	474
12/15/15	15:04	23.422	10.7	2.3	98.64	473
12/15/15	15:05	23.422	10.7	2.3	99.39	473
12/15/15	15:06	23.422	10.7	2.3	99.24	475
12/15/15	15:07	23.421	10.7	2.3	98.62	476
12/15/15	15:08	23.424	10.8	2.3	98.37	477
12/15/15	15:09	23.423	10.8	2.3	98.41	477
12/15/15	15:10	23.425	10.8	2.3	98.36	476
12/15/15	15:11	23.425	10.7	2.3	98.28	475
12/15/15	15:12	23.426	10.7	2.3	98.23	475
12/15/15	15:13	23.426	10.7	2.3	98.29	474
12/15/15	15:14	23.426	10.7	2.3	98.36	474
12/15/15	15:15	23.428	10.8	2.3	98.33	475
12/15/15	15:16	23.427	10.8	2.3	98.21	474
12/15/15	15:17	23.425	10.8	2.3	97.98	474
12/15/15	15:18	23.427	10.8	2.3	97.40	472
12/15/15	15:19	23.428	10.8	2.3	97.15	473
12/15/15	15:20	23.429	10.8	2.3	97.02	475
12/15/15	15:21	23.430	10.8	2.3	96.90	475

Average	23.416	10.8	2.3	97.75	475
Minimum	23.410	10.5	2.3	96.49	468
Maximum	23.430	10.9	2.3	99.43	479
Summation	2,926.964	1,346.0	287.5	12,219.25	59,383
Included Data Points	125	125	125	125	125
Total number of Data Points	125	125	125	125	125

F = Unit Offline

E = Exceedance

M = Maintenance

T = Out Of Control

Report Generated: 12/29/15 15:14

C = Calibration

S = Substituted

* = Suspect

U = Startup

Report Version 4.0

HTNDAHS



Project PC15-0001.18

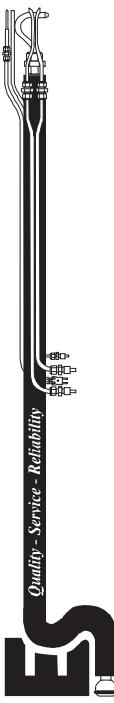
Appendix E: Calibration Information

Dry Gas Meter Pre-Test and Post-Test Calibrations

Critical Orifice Calibration Certificate

AETB Certification

METHOD 5 DRY GAS METER CALIBRATION USING CRITICAL ORIFICES



- 1) Select three critical orifices to calibrate the dry gas meter which bracket the expected operating range.
- 2) Record barometric pressure before and after calibration procedure.
- 3) Run at tested vacuum (from Orifice Calibration Report), for a period of time necessary to achieve a minimum total volume of 5 cubic feet.
- 4) Record data and information in the **GREEN** cells, **YELLOW** cells are calculated.

DATE:	7/2/2014	METER SERIAL #:	18654640
	M5-2	Critical Orifice Set Serial #:	1531S

		METER SERIAL #:		CRITICAL ORIFICE SET SERIAL #:		BAROMETRIC PRESSURE (in Hg):		INITIAL		FINAL		AVG (P _{bar})							
		K'	TESTED VACUUM	DGM READINGS (F° ³)	INITIAL	FINAL	NET (V _m)	AMBIENT	DGM INLET	DGM OUTLET	DGM AVG	V _m (STD)	V _c (STD)	(3)	Y	Average Y	Y % Diff to other orifices	Y % Diff with other orifices	ΔH @

ORIFICE #	RUN #	TEMPERATURES °F				ELAPSED TIME (MIN)				DGM ΔH (in H ₂ O)				FINAL					
		K'	TESTED VACUUM	DGM READINGS (F° ³)	INITIAL	FINAL	NET (V _m)	AMBIENT	DGM INLET	DGM OUTLET	DGM AVG	V _m (STD)	V _c (STD)	(3)	Y	Average Y	Y % Diff to other orifices	Y % Diff with other orifices	ΔH @
23	1	0.6363	16.5	234.775	243.154	8.379	75	77	78	76	76	76.75	10.00	1.8	6.8310	6.7858	0.993	1.79	
	2	0.6363	16.5	243.154	251.561	8.407	75	78	78	76	76	77	10.00	1.8	6.8507	6.7858	0.991	1.72	
	3	0.6363	16.5	251.561	260.816	9.255	75	78	79	76	77	77.5	11.00	1.8	7.5347	7.4644	0.991	1.79	
18	1	0.5004	17.5	260.816	267.502	6.686	75	78	79	77	78	78	10.00	1.1	5.4269	5.3365	0.983	1.76	
	2	0.5004	17.5	267.502	274.173	6.671	75	78	78	77	77	77.5	10.00	1.1	5.4197	5.3365	0.985	1.77	
	3	0.5004	17.5	274.173	281.527	7.354	75	78	78	77	77	77.5	11.00	1.1	5.3746	5.8702	0.983	1.77	
16	1	0.4381	18	281.527	287.454	5.927	75	78	79	77	78	78	10.00	0.87	4.8075	4.6721	0.972	1.82	
	2	0.4381	18	287.454	293.340	5.886	75	79	80	78	79	79	10.00	0.87	4.7654	4.6721	0.980	1.82	
	3	0.4381	18	293.340	299.310	5.970	75	79	80	78	79	79	10.00	0.87	4.8334	4.6721	0.967	1.82	

USING THE CRITICAL ORIFICES AS CALIBRATION STANDARDS:

The following equations are used to calculate the standard volumes of air passed through the DGM, V_m (std), and the critical orifice, V_c (std), and the DGM calibration factor, K . These equations are automatically calculated in the spreadsheet above.

$$(1) \quad Vm_{(std)} = K_1 * Vm * \frac{Pbar + (\Delta H / 13.6)}{Tm} \quad = \text{Net volume of gas sample passed through the DGM, corrected to standard conditions}$$

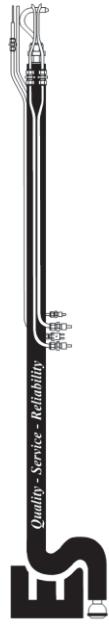
$$(2) \quad Vcr_{(std)} = K_* \frac{Pbar * \Theta}{\sqrt{Tamb}} \quad = \text{Volume of gas sample passed through the critical orifice, corrected to standard conditions}$$

$$(3) \quad Y = \frac{Vcr_{(std)}}{Vm_{(std)}} \quad = \text{DGM calibration factor}$$

$$\begin{aligned} \text{AVERAGE DRY GAS METER CALIBRATION FACTOR, } Y &= \frac{0.9827}{1.79} \\ \text{AVERAGE } \Delta H @ &= 1.79 \end{aligned}$$

$$\begin{aligned} \Delta H @ &= \left(\frac{0.75 \cdot \theta}{V_{cr}(\text{std})} \right)^2 \Delta H \left(\frac{V_m(\text{std})}{V_m} \right) \\ T_{amb} &= \text{Absolute ambient temperature (F - English, K - Metric)} \\ \theta &= \text{Absolute DGM avg. temperature (R - English, °K - Metric)} \\ K' &= \text{Average K factor from Critical Orifice Calibration} \end{aligned}$$

METHOD 5 DRY GAS METER CALIBRATION USING CRITICAL ORIFICES



EMCO

EMISSIONS MEASUREMENT COMPANY

ENVIRONMENTAL SUPPLY COMPANY

DATE: 12/22/2015		METER SERIAL #: 15550542	BAROMETRIC PRESSURE (in Hg): 23.8		FINAL AVG (P _{bar}) 23.8
METER ID #: M5-2		CRITICAL ORIFICE SET SERIAL #: 17215/15315			

ORIFICE #	RUN #	K [*]	TESTED VACUUM (in Hg)	DGM READINGS (FT ³)		AMBIENT DGM INLET NET (V _n)	DGM OUTLET INITIAL FINAL	DGM AVG	ELAPSED TIME (MIN) θ	DGM ΔH (in H ₂ O)	(1) V _c (STD)	(2) Y	(3) Y % Diff to Average Y	Y % Diff with other orifices	ΔH@			
				INITIAL	FINAL													
18	1	0.5004	18	677.954	681.223	3.269	55	50	49	49	49.5	5.00	1.1	2.7045	2.6248	0.971	1.86	
	2	0.5004	18	681.223	684.489	3.266	55	50	49	49	49.5	5.00	1.1	2.7020	2.6248	0.971	1.86	
	3	0.5004	18	684.489	687.750	3.261	55	50	49	49	49.5	5.00	1.1	2.6979	2.6248	0.973	1.86	
25	1	0.6637	16	687.750	692.068	4.318	55	52	52	50	50	51	5.00	1.8	3.5695	3.4813	0.975	1.73
	2	0.6637	16	692.068	696.395	4.317	55	54	54	52	52	53	5.00	1.8	3.5548	3.4813	0.979	1.72
17	1	0.4524	18	696.385	699.344	2.959	55	54	54	52	52	53	5.00	0.88	2.4297	2.3730	0.977	0.59
	2	0.4524	18	699.344	702.290	2.946	55	55	55	53	53	54	5.00	0.88	2.4143	2.3730	0.983	0.59

USING THE CRITICAL ORIFICES AS CALIBRATION STANDARDS:

The following equations are used to calculate the standard volumes of air passed through the DGM, V_c(std), and the critical orifice, V_c(std), and the DGM calibration factor, Y. These equations are automatically calculated in the spreadsheet above.

AVERAGE DRY GAS METER CALIBRATION FACTOR, Y = **0.9762**

INITIAL DRY GAS METER CALIBRATION FACTOR, Y = **0.9827**

% DIFFERENCE = **0.66%** (**Must be <5%**)

AVERAGE ΔH@ = **1.80**

= Net volume of gas sample passed through DGM, corrected to standard conditions

K₁ = 17.64 °R/in. Hg (English), 0.3858 °K/mm Hg (Metric)

T_m = Absolute DGM avg. temperature (°R - English, °K - Metric)

= Volume of gas sample passed through the critical orifice, corrected to standard conditions

T_{amb} = Absolute ambient temperature (°R - English, °K - Metric)

K' = Average K factor from Critical Orifice Calibration

$$(1) \quad Vm_{(std)} = K_1 * Vm * \frac{Pbar + (\Delta H / 13.6)}{Tm}$$

$$(2) \quad Vc_{(std)} = K' * \frac{Pbar * \Theta}{\sqrt{Tamb}}$$

$$(3) \quad Y = \frac{Vc_{(std)}}{Vm_{(std)}}$$

= DGM calibration factor

40 CFR Part 60, Appendix A-1 Method 2 §10.3: Temperature Sensors. After each field use, calibrate thermocouples at a temperature within 10% of the average absolute stack temperature. A reference thermocouple and potentiometer (calibrated against NIST standards) may be used. The absolute temperature measured with the sensor being calibrated and the reference sensor must agree within 1.5%.

Pre-calibration Procedure

- Check max vacuum (21-22 1/2 "Hg), leak check. Use WD-40 if necessary.
- Check pump oil fill level and pump knockout. Make sure there is extra pump oil
- Check gauge oil on manometer. Add oil if necessary. Check for spare oil in back of meter.
- Wipe interior and exterior of meter clean with wet rag/soap.
- Check for missing or loose screws on meter box, pump housing and manometer.
- Proceed to meter and thermocouple calibration.
- Initial here upon completion **PF**

Thermocouple Calibration using NIST-Trasable PIE Model 520 Calibrator

Reference Value: **250**

Console Value: **251**

Percent Difference: **0.4%**

Acceptance Criteria: ±1.5%

CERTIFICATE OF CALIBRATION

Practical Instrument Electronics
Tel: (860) 872-2600 • Fax: (860) 872-2638

This is to certify that your instrument has been calibrated using standards whose accuracies are traceable to the National Institute of Standards and Technology (formerly NBS) within the limits of the NIST Calibration Services. Actual records pertaining to these standards are on file and are available for examination.

Certified By: Practical Instrument Electronics

Recommended Recalibration: Annually

Model Number: **520-K** Serial No. **S/N 107078**

Calibration Date: **02-03-09**

In Service Date: _____

METHOD 5 CRITICAL ORIFICE CALIBRATION

CRITICAL ORIFICE SET S/N: 1531s



REFERENCE DRY GAS METER

SERIAL NUMBER: 544840

CALIBRATION FACTOR, Yc: 0.997

DATE: 3/23/2009

LEAK CHECK: Good

Barometric Pressure per Orifice AVG (P_{bar})

DGM READINGS (ft^3)

NET (N_m)

INITIAL

FINAL

DGM INLET

FINAL

DGM OUTLET

INITIAL

DGM

Avg

TEMPERATURES °F

AMBIENT

INITIAL

DGM INLET

FINAL

DGM OUTLET

FINAL

DGM

Avg

ELAPSED TIME (MIN)

DGM ΔH (in H₂O)

K' FACTOR (english)

K' FACTOR (metric/liters)

K' FACTOR (metric-m³)

K' VARIATION (%)

DATE: 3/23/2009

LEAK CHECK: Good

USING THE CRITICAL ORIFICES AS CALIBRATION STANDARDS:
Calculate the standard volumes of air passed through the DGM and the critical orifices, and calculate the DGM calibration factor, Y, using the equations in US EPA Method 5, Section 7.2.3 (these equations are programmed on the spreadsheet included with each orifice set).

Critical Orifice Set number 1531s Was calibrated in accordance with the Code of Federal Regulations, Title 40, Part 60, Appendix A, Method 5, Section 7.2

Signature _____ Date _____

K' = Critical orifice coefficient,

$[(ft^3)(^{\circ}R)^{1/2})]/[(in.Hg)(min.)]$ - English Units

$[(liters)(^{\circ}K)^{1/2})]/[(mm Hg)(min.)]$ - Metric-Liters Units

$[(m^3)(^{\circ}K)^{1/2})]/[(mm Hg)(min.)]$ - Metric Units

03/23/09

Signature

RE: Certification of Air Emission Testing Body (AETB) Conformance

To Whom it May Concern:

This letter is to confirm that Emissions Measurement Company LLC ("EMCo") is an Air Emission Testing Body (AETB) operating in conformance with ASTM D7036-04, as required by 40 CFR Part 75, Appendix A §6.1.2. The table below lists the EPA Reference Methods for which each listed Project Manager is a Qualified Individual and other relevant information required by (as applicable) 40 CFR Part 75.59(a)(15), 40 CFR Part 75.59(b)(6) and 40 CFR Part 75.59(d)(4).

Emissions Measurement Company (800) 984-9883					
AETB Qualified Individual Information					
QI Name	QI Email	Exam*	Exam Date	Exam Provider	Provider Email
Andrew Bruning	abruning@stacktest.us	SES Group 1	6/12/2014	SES	QSTIprogram@gmail.com
		SES Group 2	9/18/2015		
Mike Corrigan	mcorrigan@stacktest.us	SES Group 3	6/12/2015	Ohio-Lumex	andrew.mertz@ohiolumex.com
		EPA Method 30B	1/16/2015*		
Craig Kormylo	ckormylo@stacktest.us	SES Group 1	4/1/2015	SES	QSTIprogram@gmail.com
Matthew Parks	mparks@stacktest.us	SES Group 3	5/12/2011	Ohio-Lumex	andrew.mertz@ohiolumex.com
		EPA Method 30B	1/16/2015*		
*The Source Evaluation Society (SES) Group 1 Exam includes EPA Reference Methods 1, 1A, 2, 2A, 2C, 2D, 2F, 2G, 2H, 3, 3B, 4, 5, 5A, 5B, 5D, 5E, 5F, 5I, 17, 19, 201A and 202. The SES Group 2 Exam includes EPA Reference Methods 1, 2, 3, 4, 3B, 6, 6A, 6B, 7, 7C, 7D, 8, 11, 13A, 13B, 15A, 16A, 19, 26, 26A and 202. The SES Group 3 Exam includes EPA Reference Methods 3A, 6C, 7E, 10, 10B, 20, 25A, 40 CFR Part 60 Performance Specifications 2 – 8, 15 and <u>40 CFR Part 75</u> . Initial 30B training provided by Ohio-Lumex; refresher exam administered by EMCo once every five years.					

Please feel free to contact me with any questions regarding the above.



Matthew Parks
Technical Director